



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/516,714

02/06/2006

Vincent Le Nir

F40.12-0030

6619

27367 7590 05/11/2009
WESTMAN CHAMPLIN & KELLY, P.A.
SUITE 1400
900 SECOND AVENUE SOUTH
MINNEAPOLIS, MN 55402

EXAMINER

FLORES, LEON

ART UNIT

PAPER NUMBER

2611

MAIL DATE

DELIVERY MODE

05/11/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/516,714	Applicant(s) LE NIR ET AL.	
	Examiner LEON FLORES	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 February 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) 11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 February 2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-10) have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. **Claims (1-6 & 9-10) are rejected under 35 U.S.C. 102(e) as being anticipated by Hottinen et al. (hereinafter Hottinen) (US Patent 7,436,896 B2)**

Re claim 1, Hottinen discloses a method for sending a signal implementing N_t transmit antennas, with $N_t \geq 2$, wherein the method implements the following steps, for at least one vector comprising N symbols to be sent: dividing said vector into N_t sub-vectors (See fig. 1: 103 "each of these vectors are transmitted using N_t antennas 109); multiplying each of the N_t sub-vectors by a distinct sub-matrice (See fig. 1: 106 & equation 6), each sub-matrix being associated with one of the transmit antennas (See fig. 1: 106 & equation 6 "sub-matrix is X "), and said sub-matrices being obtained by subdivision of a unitary square matrix (See fig. 1: 105 & col. 5, lines 26-65 "it is inherent that the unitary matrix is subdivided to N_t antennas" "Also see equations 4-5"); and

Art Unit: 2611

sending, from the N_t transmit antennas, the N_t sub-vectors resulting from the multiplying step. (See fig. 1: 109 & col. 6, lines 15-56)

Re claim 2, the reference of Hottinen further discloses implementing N_t antennas, wherein each of said sub-matrices has a size of $(N/N_t) \times N$. (See col. 5, lines 11-55)

Re claim 3, the reference of Hottinen further discloses that wherein N/N_t is greater than or equal to 2. (See fig. 1 & col. 5, lines 27-50)

Re claim 4, the reference of Hottinen further discloses that wherein said unitary matrix is full. (See col. 5, lines 46-65)

Re claim 5, the reference of Hottinen further discloses that wherein said unitary matrix belongs to the group comprising: the real Hadamard matrices; the complex Hadamard matrices; the Fourier matrices; the real rotation matrices; the complex rotation matrices. (See col. 5, lines 17-20 "Hadamard codes")

Re claim 6, the reference of Hottinen further discloses that wherein implements two transmitter antennas and said sub-matrices have a value of $\begin{bmatrix} 1 & 1 \end{bmatrix}$ and $\begin{bmatrix} 1 & -1 \end{bmatrix}$. (See equation 7)

Re claim 9, Hottinen discloses a method for the reception of a signal corresponding to the a combination of contributions of N_t transmit antennas, with $N_t \geq 2$, wherein for at least one vector comprising N symbols to be sent, the signal is generated by dividing said vector into N_t sub-vectors, multiplying each of the N_t sub-vectors by a distinct sub-matrice, each sub-matrix being associated with one of the transmit antennas, and said sub-matrices being obtained by subdivision of a unitary square matrix, and sending, from the N_t transmit antennas, the N_t sub-vectors resulting from the multiplying step, wherein the signal forms, seen from a receiver, a single combined signal representing the multiplication, wherein the method of reception comprises: implementing at least one receiver antenna (See figs. 2-3); receiving said single combined signal on each of said receiver antennas (See figs. 2-3); and decoding said single combined signal a decoding matrix corresponding to a matrix that is the conjugate transpose of said unitary matrix. (See col. 6, lines 45-67 "it is inherent that decoding is based on the conjugate of H , and H depends on the code matrix and the channel")

Re claim 10, the reference of Hottinen further discloses that wherein a maximum likelihood decoding is applied to the data coming from the multiplication by said conjugate transpose matrix. (See col. 6, lines 45-67)

Art Unit: 2611

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. **Claims (7-8) are rejected under 35 U.S.C. 103(a) as being unpatentable over Hottinen et al (hereinafter Hottinen) (US Patent 7,436,896 B2), as applied to claim 1 above, and further in view of Agrawal et al. (hereinafter Agrawal) (US Patent 6,873,606 B2)**

Re claim 7, although these unitary matrices are well known in the art, the reference of Hottinen fails to explicitly teach that wherein the method implements two transmitter antennas and said sub-matrices have a value of

$$\frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & -1 & 1 & -1 \end{bmatrix} \text{ and } \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 & -1 & -1 \\ 1 & -1 & -1 & 1 \end{bmatrix}$$

However, Agrawal does. (See equations 10-12) Agrawal discloses a Matrix M which has these two sub-matrices.

Therefore, taking the combined teachings of Hottinen and Agrawal as a whole, it would have been obvious to one of ordinary skills in the art to incorporate these features into the system of Hottinen, in the manner as claimed and as taught by Agrawal, for the benefit of satisfying the per-antenna power constraint.

Re claim 8, although these unitary matrices are well known in the art, the reference of Hottinen fails to explicitly teach that wherein the method implements four transmitter antennas and that said sub-matrices have a value

$\begin{bmatrix} 1 & 1 & 1 & 0 \end{bmatrix}, \begin{bmatrix} 1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} 0 & 1 & -1 & -1 \end{bmatrix}$ and $\begin{bmatrix} 0 & -1 & -1 & 1 \end{bmatrix}$.

However, Agrawal does. (See equations 10-12) Agrawal discloses a Matrix M which has these four sub-matrices.

Therefore, taking the combined teachings of Hottinen and Agrawal as a whole, it would have been obvious to one of ordinary skills in the art to incorporate these features into the system of Hottinen, in the manner as claimed and as taught by Agrawal, for the benefit of satisfying the per-antenna power constraint.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

Art Unit: 2611

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEON FLORES whose telephone number is (571)270-1201. The examiner can normally be reached on Mon-Fri 7-5pm Alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2611

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/L. F./
Examiner, Art Unit 2611
May 8, 2009

/Kevin M. Burd/

Primary Examiner, Art Unit 2611